1/4 B.Tech SECOND SEMESTER

EE2T4 ELECTRONIC DEVICES AND CIRCUITS Credits: 4
Lecture: 4 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives:

- To study in detail about construction of several electronic devices
- To analyse the characteristics of various electronic devices and circuits
- To get familiarize in biasing and stabilization concepts

Learning Outcomes: Students will get in-depth knowledge about

- The Semiconductor Devices like Diode, BJT, Uni-polar devices like JFET, MOSFET and UJT
- Analysis and operation of simple electronic circuits like rectifiers, regulators and amplifiers.
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Unit 1: Rectifiers and Filters

Half wave Rectifier, Full wave and Bridge Rectifier, derivation of Ripple factor, Form factor, peak factor, efficiency of Half wave, full wave and Bridge rectifiers. Filters – C, L-section, LC and CLC filters, Comparison of filters, simple circuit of a voltage regulator using zener diode, series and shunt voltage regulators.

Unit 2: Transistor Biasing

Operating point, basic stability, fixed bias, Collector to base bias, self bias, stabilization against variations in V_{BE} and β for self bias circuits, Stabilization factors (S,S',S''), Bias compensation, thermistor and sensistor compensation, compensation against variations in V_{BE} and $I_{CO,}$ thermal runaway and thermal stability.

Unit 3: BJT Amplifiers

Introduction, Classification of amplifiers, Single stage amplifiers, characteristics of CE,CB and CC amplifiers.

Unit 4: Small Signal Low frequency Transistor Model

Two port devices and hybrid model, transistor hybrid model, determination of h-parameters, Analysis of transistor amplifier circuit using h-parameters, comparison of transistor amplifier configurations.

Unit 5: FET Amplifiers

FET as an amplifier, characteristics of CS, CD and CG amplifiers, Amplifier classification based on biasing.

Unit 6: Special Devices
UJT- construction, characteristics, applications, Silicon Controlled Rectifier - construction, characteristics, applications, DIAC - construction, characteristics, applications, TRIAC - construction, characteristics, applications, Light activated SCR, Opto couplers, electromagnetic relays.

Unit 7: Feedback Amplifiers
Introduction, Basic concept of feedback, Effects of negative feedback, Types of negative feedback connections, stability in feedback amplifier.

Unit 8: Oscillators
Introduction, conditions for oscillations, classification of oscillators, general form of LC oscillator, Hartley oscillator, colpitts oscillator, RC Phase shift oscillators, wien-bridge oscillator, crystal oscillator, frequency stability of oscillator.

Text books:

1. Electronic Devices and Circuits – J.Milliman, C.C Halkias, Tata Mc-Graw Hill
2. Integrated electronics - J.Milliman, C.C Halkias, Tata Mc-Graw Hill
3. Electronic Devices and Circuits –Salivahanan, Kumar, Vallavaraj., Tata Mc-Graw Hill, Second edition.

Reference Books:

1. Thomas L. Floyd, "Electronic Devices",Pearson, 7^{th} edition.
2. David A.Bell, "Electronic Devices and Circuits", Oxford, 5^{th} edition.
3. Streetman Baneree,"Solid State Electronic Devices", PHI publications, 5^{th} edition.